

RESEARCH ARTICLE

# First record of *Choleva macedonica* (Coleoptera, Leiodidae, Cholevine) from the Carpathians

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## Abstract

The rare and little-known species *Choleva macedonica*, previously known from the Dinaric Alps - Balkans, belonging to the "sturmi group" of species is recorded for the first time in the Carpathians and in the Romanian fauna. The male specimen collected in the Southern Carpathians is accurately described and illustrated as a "prodrome" for a possible new subspecies of *C. macedonica*. Brief observations on *Choleva* species from the Romanian fauna and their ecological importance are presented. The biogeographical importance of this new record is emphasized.

## Keywords

*Choleva macedonica*, *Choleva sturmi* Cholevinae, Coleoptera, Leiodidae, Comarnic Cave, Southern Carpathians, Romania, Egeida, Taxonomy, Zoogeography.

## Introduction

The genus *Choleva* Latreille, 1796 includes approximately 63 detritivore species, most of them distributed in the Western Palearctic Region (Europe, Turkey, Transcaucasia, North Africa), some of them being known from Asia Minor and northern India (Růžicka 1993; Giachino and Vailati 2000; Růžicka and Vávra 2003; Lompe 2023). Of these, 12 species were recorded for the Romanian fauna, two of them (*C. sturmi*

*C. Brisout de Barneville*, 1863 and *C. elongata* Paykull, 1798) requiring confirmation of their presence in Romania (Nitzu 2013).

Jeannel (1923, 1936), based on the sclerites of the internal sac of the aedeagus, and other morphological characters, divided the genus *Choleva* into two subgenera (*Cholevopsis* and *Choleva*) and eleven species groups. In 1996 Perreau described a third subgenus – *Protocatops*, for two species from Nepal and northern Vietnam. According to Jeannel (1936), only seven species of *Choleva* were included in the *sturmi* group. Adding the species *C. leucophthalma* Fiori 1899 - cited by Jeannel (1936) as junior synonym of *C. sturmi*, but resurrected as a valid species by Sokolowski (1941) and redescribed by Bordoni (2005), the “*sturmi*” group raised up to eight species. *C. macedonica* Karaman, 1954 was previously considered as a morphological intraspecific variation of *C. sturmi* by Szymczakowski (1976). Nonveiller et al. (1999) revised and validated the status of *real species* (bona species) for *C. macedonica* and this taxonomic status is recognized up to present (Perreau 2004). To these, Giachino and Vailati (2000) added the species *C. uludagica* described from Turkey. In total we consider ten species included in the “*sturmi*” group of species. In this paper, *C. macedonica*, previously described and recorded only from the Dinaric and Vitosha Mountains, is presented for the first time from the Southern Carpathians.

*C. macedonica* was described based on a male specimen from Macedonia (Cave Bela Voda) (Karaman 1954) and redescribed by Nonveiller et al. (1999) from “Demir kapija, pećina «Bela voda», 6-IX-1969, 1 ♂ (M. Karaman)”. Then it was recorded from Bulgaria (Langourov et al. 2014) - only two male specimens, one of them without head and pronotum - in Bosnek Vill., Popov Izvor Karst spring (Bekchiev and Gueorguiev 2014) and a single specimen from Romania (in this article). Due to the lack of several comparative specimens, we consider that a new subspecies is not suitable to be described at this time, but the detailed description of the analyzed material could be valuable for future taxonomic studies.

## Material and methods

The specimen was collected in the Comarnic Cave, by direct sampling with tweezers, on the floor of the entrance gallery. The Comarnic Cave (5229 m development) is located in a beech forest at 469 m altitude, GPS coordinates: 45°10'42" N; 21°56'54.56" E (DMS) and is included in the Semenic-Cheile Carașului National Park.

The specimen was preserved in 75% ethanol and examined using a Zeiss “Discovery V8” stereoscope with 8 to 85X magnification, equipped with an Olympus camera. After extraction, the genitalia was boiled in a 7% KOH solution, then washed with distilled water and then immersed in glycerol for examination.

Photos were processed using CombineZM program (Hadley 2008). A Karl Zeiss micrometer was used for the measurements. After the examination, the specimen was glued with *Sindeticon* (a mixture of glycerol, Merk gelatin, acetic acid and water)

on a standard entomological cardboard tag. The genitalia was included in *Sindeticon* transparent gel (water soluble) on a separate standard tag.

## Results and discussions

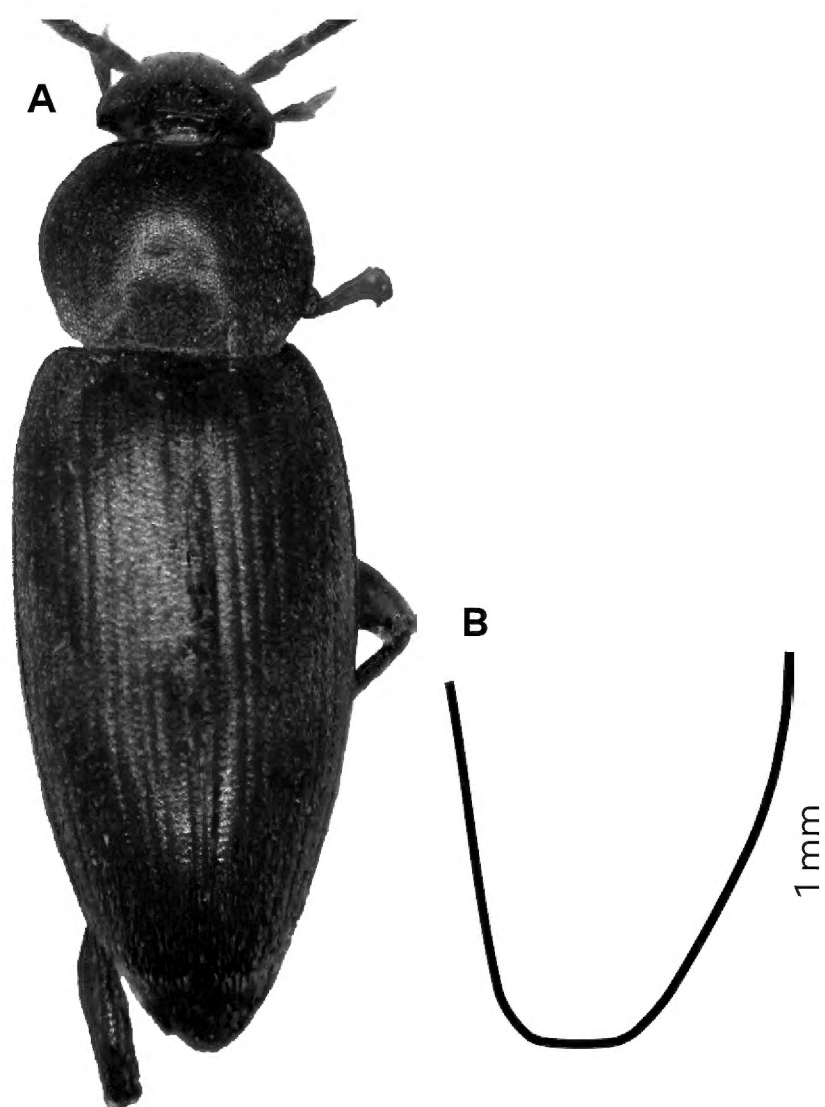
### *Choleva macedonica* Karaman, 1954

Description of the male specimen of *Choleva macedonica* from the Southern Carpathians. (Figs. 1–5).

Material: Romania. ♂ Peștera Comarnic (Comarnic cave); 18.X.2009, Leg. Nae A. Deposited in Zoological Collection of “Grigore Antipa” National Museum of Natural History in Bucharest.

#### Description.

Body length 4.75 mm. Body slender (Fig. 1A). Head, pronotum and elytra piceous-brown. Antennae brown. Legs and palpi reddish-brown. Body covered with a relatively short, recumbent golden-brown pubescence.



**Figure 1.** *Choleva macedonica* (Comarnic Cave, the Carpathians): **A** Habitus; **B** Shape of apical part of elytron.

Head surface finely and relatively sparsely punctated, with distinct microsculpture composed of polygonal, approximately isodiametric meshes.

Antenna long and slender (2.45 mm length). The length of antennal segments I to XI (in micrometers): 22.6, 18.86, 32.0, 26.4, 20.7, 22.6, 20.7, 13.2, 18.86, 16.9, 32.0. The shape of antennal segments as in Fig. 2.

Pronotum 1.30 times as wide as long, widest at the middle. Sides regularly curved, posterior angles rounded. The surface regularly convex with a very shallow centro-basal depression, preceded by two small, shallow, latero-medial, round depersions (Fig. 1A). The surface with a distinct leatherlike microsculpture. Punctuation as on the head.

Scutellum with rough microsculpture.

Elytra 1.72 times as long as wide. Surface with fine microsculpture, densely and uniformly punctate. Elytron with 8 distinct striae (Fig. 1A) and with subtruncate apex (with medial margin straight and rounded at sutural and marginal corners) (Fig. 1B).

Protarsus with first segment (protarsomer) wider than apical part of protibia (Fig. 3). Mesotibia straight, slightly bent only in the apical portion.

Metafemur with one tooth at basal third of posterior margin (Fig. 4).

Metatrochanter elongate, pointed apically, without postero-basal tooth and with straight posterior margin (Fig. 4).



**Figure 2.** Head and antenna (lateral view) of *Choleva macedonica* (Comarnic Cave, the Carpathians, Romania).



**Figure 3.** Protarsus of *Choleva macedonica* (Comarnic Cave, the Carpathians, Romania).

Abdominal sternites regularly convex, without medial depression.

Aedeagus (Fig. 5 A–F) long, abruptly arched in its basal third. Aedeagal apex (tip) rounded concave in the middle (with a small rounded apical depression). Each lateral side of the aedeagal apex with a distinct triangular lobe, rounded apically (Fig. 5 C–E). Parameres long, slightly longer than aedeagus (Fig. 5 A, B).

The ventral sclerite of the internal sac (Fig. 5F) is large, stretched “S” shaped, with the apical part elongate, and with the apex rounded and bent posteriorly. On the posterior side, with an elongated protrusion located near the middle, close to the point of the inflection of the sclerite, describing a distinct angle with the posterior margin.

The aedeagal shape, the shape of the metatrochanter, the elytral tip of the male specimen found in the Southern Carpathians, match the morphological characteristics described by Karaman (1954) for *C. macedonica*.

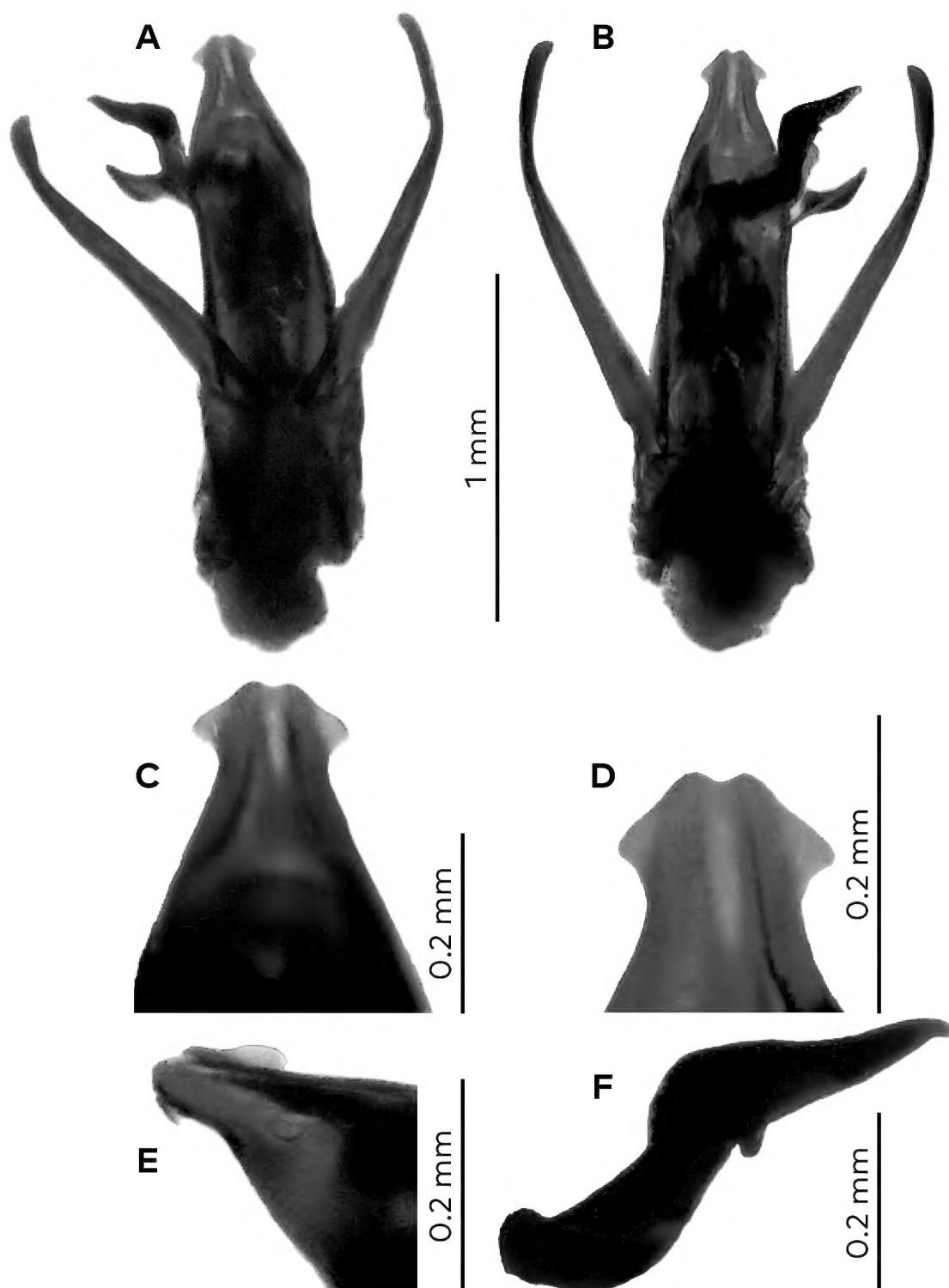
Some differences were noted in the morphology of the ventral sclerite of the aedeagal sac compared to the original description (an elongated prominence located near the middle, close to the point of inflection of the sclerite, describing a distinct angle with the posterior margin).

However, the rarity of the specimens observed so far (all findings) does not allow us to raise, at this moment, the new discovery from the Carpathians to the level of a new subspecies. Future studies, based on a larger number of specimens, will be able to resolve the subspecies status of this taxon. For this, we have provided the detailed description of this male specimen from the Carpathians.



**Figure 4.** Metafemur and metatrochanter of *Choleva macedonica* (Comarnic Cave, the Carpathians, Romania).

Besides the interesting taxonomic problems raised by this new discovery, the zoographic aspect is most important. This rare species of *Choleva* (recorded from the Dinaric Alps, the Balkans and now in the Southern Carpathians), brings back Jeannel's theory of the Aegean corridors "sillon transégéen" in the distribution of *Choleva* species in Europe during the Miocene-Pliocene (Jeannel, 1923). This theory highlights the affinities of the Dinaric area with the Balkan Peninsula and the Caucasus, as centers of origin and dispersal of the fauna from the landmass called Egeida (*Egéide* - Jeannel 1923).



**Figure 5.** Aedeagus of *Choleva macedonica* (Comarnic Cave, the Carpathians, Romania): **A** dorsal view; **B** ventral view; **C** apex of aedeagus (dorsal view); **D** apex of aedeagus (ventral view); **E** apex of aedeagus (lateral view); **F** ventral sclerite.



The specimen was collected in the Comarnic cave together with *Choleva oblonga* Latreille, 1807. In the Romanian fauna, seven species of *Choleva* were recorded in caves, most of them being subtroglophiles (dependent on the underground environment in certain stages of their life cycle - most of their life cycle being epigeal) and only two of them (*Choleva cisteloides dacica* Jeannel, 1922 and *C. glauca* Britten, 1918) were considered troglophiles (species able to live and reproduce both in caves and in epigaeic environment) (Nitzu 2013). All species of *Choleva* are detritivores, many of them being scavengers (Szymczakowski 1957, 1971; Kočárek 2003) and usually inhabiting the burrows and nests of mammals (Růžicka and Vávra 2003). Subterranean and endogean habitats play an important role in the conservation of species richness and biodiversity of small carrion beetles (Leiodidae, Cholevinae) (Nitzu 2021). Small carrion beetles play a key role in the functioning of ecosystems by decomposing biological detritus and in the flows of organic matter and energy in nature (Gers 1998; Esh and Oxbrough 2021).

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